Integration and Test

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I&T Assumptions

- I&T in JHU/APL clean rooms.
- Vibration testing performed at JHU/APL.
- Thermal vacuum testing performed at Goddard.
- Test philosophy based on documents SDO 2387-1, MIL-STD-1540B, and GEVS-SE Rev A.
- Test it as we fly it.

I&T Objectives

- Test the two STEREO spacecraft under ambient conditions and simulated environments expected to occur during launch and in orbit.
- Establish correct operations of all subsystems and instruments when interconnected as a spacecraft.
- Validate spacecraft system performance through functional and performance test on each spacecraft under mission level environmental stress.
- Autonomy and fail safe modes will be tested at the spacecraft level.

I&T Top Level Requirements

- No engineering units to be installed on spacecraft.
- Test and operate two spacecraft simultaneously.
- Decoupled Instrument Operations.
- Collect, process, and transmit instrument commands from the STEREO instrument GSE and SOC to the instruments.
- Transmit science telemetry data to the instrument developers and coordinate with the instrument developers to assure the capability of the instruments to perform as required on the spacecraft.
- Maintain UT on each spacecraft to within 0.5 seconds of UT.

I&T Flow Down Requirements

- Develop a Ground Support System for the testing and operation of two simultaneous spacecraft.
  - GSS will remain at JHU/APL for all phases of I&T, Launch Site Operations, and Mission Operations.
  - Collect and archive all raw telemetry during I&T.
  - Process and evaluate all spacecraft, non-science, telemetry during I&T.
  - Maintain command and telemetry dictionaries during I&T.
- Prepare a comprehensive Integration & Test plan and schedule.
- Ground support equipment must support the simultaneous Integration and Test and Launch Site Operations of the two spacecraft.
- Subsystems and instruments delivered to spacecraft flight qualified along with GSE for checkout and operation.

I&T Concepts

- **Two spacecraft will be handled as one spacecraft with a side A and B.**
- Require the two spacecraft be identical in form, fit, function and interface. Differences will be addressed at the program level.
- The Mission Operations team will be combined with the I&T team during I&T and launch operations.
- GSS will remain at JHU/APL through launch. Only the minimal set of equipment will accompany the S/C to thermal vacuum and the launch site.

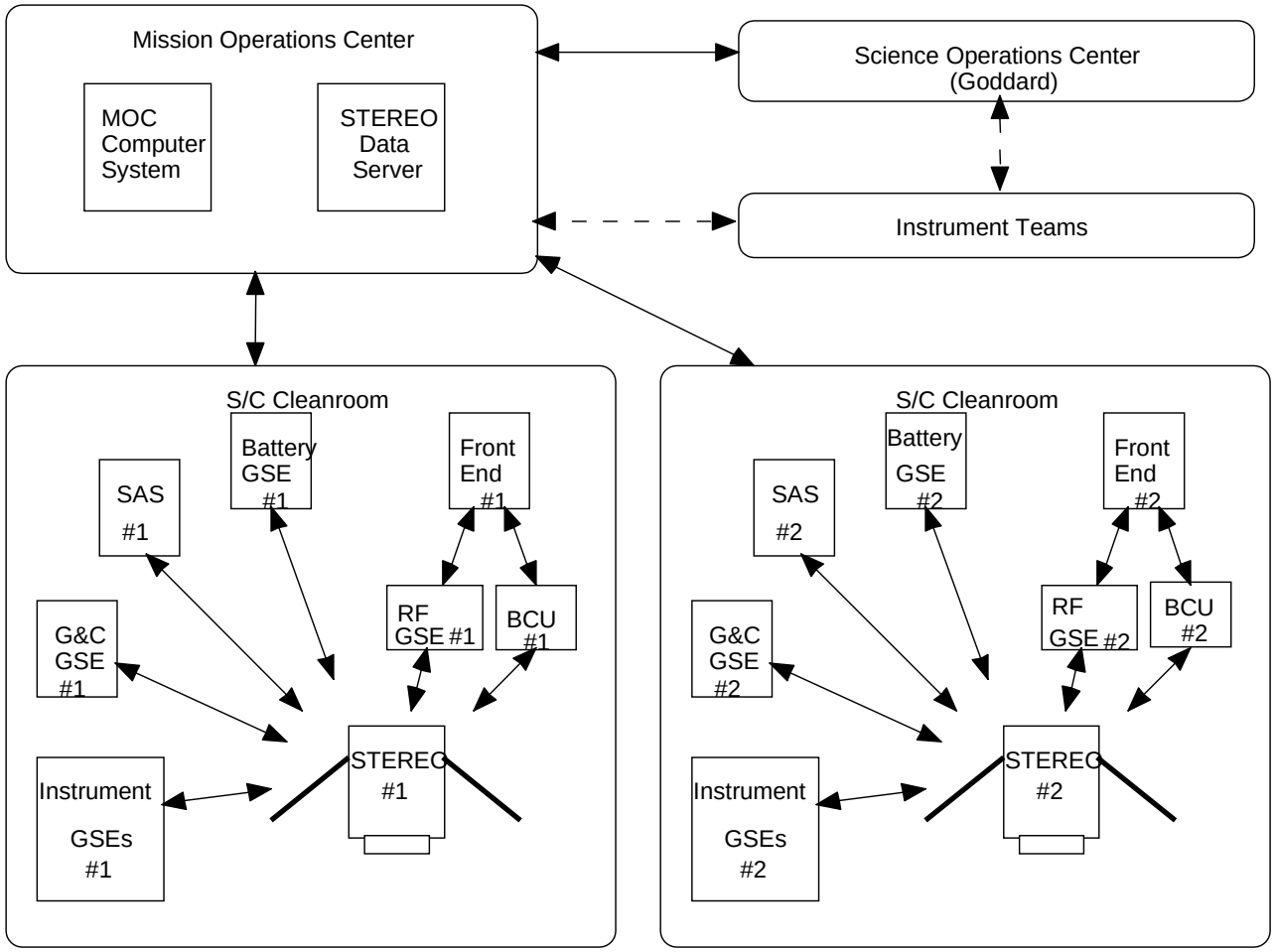
GSS Flow Down Requirements

- Perform remotely from JHU/APL the following on two spacecraft, individually or simultaneously.
  - Decommutate and display housekeeping telemetry from DSN, clean room, environmental testing, or Cape Canaveral
  - Send commands via DSN, clean room, environmental testing, or Cape Canaveral
  - Store all housekeeping telemetry
  - Maintain memory maps
  - Telemetry alarm processing

GSS Flow Down Requirements (con't)

  - Data plotting and trending
  - Contact planning
  - Maintain spacecraft clocks to within 0.5 second
  - Pass ephemeris data for antenna pointing to DSN
  - Receive instrument commands, verify, pass to spacecraft
  - Decommutate IEM memory dumps
- Autonomous contact operations
- Support SSR data playbacks

STEREO I&T Conceptual Block Diagram



Harness

- Requirements – TIMED like
  - 1553
  - Power
  - Thermal
- Built to JHU/APL Harnessing Guidelines
- Additional TBD requirements to follow
- Study – Remote I/O chip impact

I&T Schedule

- Integration will take place over a seven month period for both spacecraft
  - I&T starts with the delivery of the flight qualified power system.
  - After successful I&T of the flight qualified power system on spacecraft A, then spacecraft B will have the flight qualified power system installed.
  - Process continues for each subsystem and instrument on spacecraft A & B.
  - Integration is complete when both spacecraft have all subsystems and instruments installed, a performance test has been successfully completed, and the spacecraft are ready for environmental test.
- Environmental testing will take place over a three month period for both spacecraft. At the conclusion both spacecraft will be ready to ship to the launch site.

I&T Schedule

Integrate STEREO S/C A (side A) & STEREO S/C B (side B)	Environmental Testing STEREO S/C A STEREO S/C B

0 Months 7/ 8 Months 10